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# The Business Case for a Diabetes Self-Management Intervention in a Community General Hospital

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## Abstract

There is a growing and increasingly compelling body of evidence that self-management interventions for persons with type 2 diabetes can be both effective and cost-effective from a societal perspective. Yet, the evidence is elusive that these interventions can produce a positive business case for a sponsoring provider organization in the short term. The lack of a business case limits the enthusiasm for provider organizations to implement these proven quality-enhancing interventions more widely. This article provides a case example of a self-management intervention in a community general hospital targeting an underserved population who have significant barriers to receiving regular health care. The 3-component program sought to improve meaningful access to care, increase health literacy related to type 2 diabetes, and partner with the enrollees to make long-term lifestyle changes. The intervention not only resulted in significant improvements in HbA1c levels (-0.77%) but saved the hospital an average of \$551 per active patient per year, primarily by reducing hospital visits. With only 255 actively enrolled patients, the hospital can recover fully its total direct annual personnel and operating costs for the program. Because the program serves patients who would have been seen at other hospitals, it also enhanced care quality and reduced costs for the broader community in which the program is embedded. (*Population Health Management* 2012;15:230–235)

## Introduction

THERE IS INCREASING EVIDENCE THAT SELF-MANAGEMENT interventions for persons with diabetes are both effective and cost-effective.<sup>1–4</sup> Yet, demonstrating that these programs can yield a positive business case in the short term remains an elusive goal from the perspective of an organization sponsoring the intervention.<sup>5</sup> This is especially true when the intervention in future years must be supported entirely by internal resources and cannot rely on significant external funding from foundations or governmental agencies. Recognizing this challenge, most foundations now encourage their grantees to develop a sustainability plan to ensure that the intervention has a high probability of being continued after the grant funding has terminated.

From the perspective of the organization that implements the intervention, a positive business case requires that cost reductions (and/or revenue increases) will offset the incremental expenses required to implement the intervention.<sup>6</sup>

The absence of a positive business case in the short term makes it difficult to argue effectively for devoting scarce organizational resources to behavioral interventions or to persuade payers to reimburse behavioral interventions adequately. This is especially true when the savings are realized only in the long term (ie, well beyond the current fiscal year) or would accrue to organizations other than the provider organization that actually implements the intervention (eg, governmental or commercial payers).

In this article, the authors describe and evaluate an educational and self-management intervention for persons with type 2 diabetes in a community general hospital setting that not only improves patient outcomes but results in actual cost savings to the hospital that houses the program. In addition, the program results in real cost savings for the larger community in which it is embedded. At program end, the Collaborate for Self Management Improvement in Diabetes (CSI-Diabetes) program was serving 220 patients from St. John's Regional Medical Center and from neighboring

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hospitals within the service area. The cost avoidance study reported here is based on data from 81 patients of Mercy Hospital Joplin. Therefore, the potential for cost avoidance extends beyond Mercy Hospital to neighboring hospitals within the service area.

### *Diabetes burden in Southwest Missouri*

The prevalence of diabetes in Southwest Missouri is extremely high. Behavioral risks known to contribute to the development and worsening of diabetes also are high for adults living in Southwest Missouri (64.65% are overweight or obese; 29.32% report having had no physical exercise of any kind during the last month; and 34.27% are current smokers).<sup>7</sup> According to the American Diabetes Association, the average medical expenditures among people with diagnosed diabetes are approximately 2.3 times higher than they would be in the absence of diabetes. Two thirds of the cost of diabetes is related to excess medical expenditures attributed to diabetes, mostly from preventable conditions.<sup>8</sup> “The largest components of medical expenditures attributed to diabetes are hospital inpatient care (50% of total cost), diabetes medication and supplies (12%), retail prescriptions to treat complications of diabetes (11%), and physician office visits (9%).”<sup>9</sup> The rate of diabetes-related inpatient hospitalizations is 23.2 per 10,000 in the Jasper and Newton Counties compared to the state rate of 17.2 per 10,000.<sup>10</sup>

Although 20% consider themselves to be in fair or poor health,<sup>7</sup> this population lacks adequate access to primary health care. Contributing factors include low per capita income, high poverty levels,<sup>11</sup> and lack of health insurance (18%).<sup>7</sup> High cost and inadequacy of transportation contribute to lack of access. Additionally, physician shortages and scarce public resources for primary health care leave few treatment options for the uninsured who are indigent or low-income earners.<sup>12</sup>

Finally, between 1990 and 2009, Southwest Missouri experienced more than a 9-fold increase in the Hispanic population, in which there is a high prevalence of diabetes; this population continues to grow rapidly.<sup>13</sup> Many are immigrants who work in relatively low-wage, low-skilled employment, thus contributing to the increase in poverty rates and adding language and cultural barriers to receiving good care.

### *Program description overview*

Under the direction of the Self-Management of Diabetes Task Force, a multidisciplinary and multi-organizational team of health care providers, Mercy Hospital Joplin and its partners implemented a 3-year, 3-component program to improve meaningful access to health care, increase the health literacy of its patients with type 2 diabetes, and partner with them to make long-term lifestyle changes. CSI-Diabetes was designed to ensure that people with type 2 diabetes were knowledgeable about their health and empowered to play a central role in their care and self-management. The goal of the program was to improve health and quality of life, and to reduce the use of high-cost health care resources for uninsured and underinsured adults with type 2 diabetes in Southwest Missouri. Intervention strategies included (1) diabetes education, (2) self-management skills training, and (3) diabetes case management services.

### *Program implementation*

Diabetes screenings, self-management education, skills training, and case management were provided at no charge to patients diagnosed with type 2 diabetes at participating sites: the free clinics in Joplin and Carthage (Jasper County), and the federally qualified health center clinics in Anderson (McDonald county) and Joplin. These services were not offered previously. Physicians and clinicians at the clinics provided the basic initial assessment, diagnosis, and referral to the Mercy Hospital Joplin CSI-Diabetes program. Grant funding from the Missouri Foundation for Health, Better Self Management of Diabetes (BSMOD) program supported the 3-year implementation of the CSI team and services. The CSI team, comprising a registered dietitian and a registered nurse, then conducted a comprehensive individual assessment of each patient referred and offered them the program services. If the patient was agreeable, they were scheduled for education courses and ongoing case management.

Each week, the CSI team traveled throughout the service area and worked with patients on site to set short- and long-term goals, provide individual education, monitor progress, and help improve patients' coping skills. They also offered five, 2-hour group sessions at each location on a rolling basis so that patients could join anytime during the course of their self-management program. Selected topics included a diabetes overview, nutrition I, nutrition II, monitoring, and complications. The US Diabetes *Conversation Map*<sup>®</sup> Program was used in the group education sessions. Some educational sessions as well as follow-up calls and visits were conducted in Spanish with the assistance of a medical interpreter. By providing CSI-Diabetes at clinics that patients were already using, the team hoped to increase patients' ability to access services in an appropriate and timely manner, thereby reducing the need for and use of emergency care.

Ongoing case management, as well as other specialty support, was offered to all participants. Participants were scheduled for face-to-face follow-up meetings with the CSI team every 6 to 8 weeks to monitor and support goal attainment and clinical control. The CSI-Diabetes team supported patient self-management in a variety of ways, including self-management training and monthly support group meetings at each clinic; monthly letters to remind participants of support groups; exercise booklets to support physical activity; and a weight management course. To keep patients engaged, the team also offered taste testing and cooking demonstrations, and responded to patient requests for support group topics. CSI-Diabetes also held 2 annual events—Diabetes Day and a fall festival—to celebrate successes and to offer digital retinal eye screenings, dental screening, depression screening, and foot exams to all patients.

Community collaboration was an essential component of the CSI-Diabetes program. Working in conjunction with local optometrists, CSI-Diabetes offered eye screenings while the local Lion's Club offered comprehensive eye exams for those identified with problems. Pharmaceutical companies provided educational materials, dining-out meal guides, cookbooks, and lancets. CSI-Diabetes also collaborated with a local university dental hygiene school and referred patients for X-rays and cleanings. Finally, the team worked with

patients individually to ensure that barriers to receiving services were minimized.

## Methods

### Study design and key measures

This study was a before-after design with no comparison group. Patient clinical outcomes, utilization of services, and program costs were tracked and analyzed over time. A stand-alone Microsoft Access database was developed specifically for this program to track patient-specific data longitudinally. The database tracked intake information and patient-level outcomes including: weight, body mass index (BMI), goal setting and goal attainment, lab values, annual exams, attendance at educational sessions and pre/post test scores, measures of lifestyle behaviors such as number of days eating fruits and vegetables and exercising, and follow-up calls and visits. Clinical outcomes such as HbA1c, low-density lipoprotein cholesterol, systolic blood pressure, diastolic blood pressure, and BMI were used to assess program impact. Program expenses were tracked using the hospital's accounting software. Cost avoidance financial data were tracked using the hospital's TRENDSTAR<sup>®</sup>, a hospital data warehousing/decision-support system. (Originally created by Amherst Associates, Inc., a hospital consulting company in the 1980s, Amherst was acquired by HBOC [HBO & Company] in 1985, and HBOC was acquired by McKesson in 2000.) Tracked data included hospital charges, payments, actual costs, and bad debt charges for each patient visit in both the inpatient and outpatient settings. Mercy is a fee-for-service hospital, but if patients receive charity care, there is no reimbursement to the hospital. Because two thirds of the patients enrolled in the program were self-pay charity care, the hospital saves money if it can help these patients maintain their health, thereby reducing their need for hospital services. To evaluate program costs, hospital utilization and cost avoidance before and after program enrollment were assessed. These data were used to answer the key financial question: At what patient volume does the program become financially self-supporting?

### Study population

During the period from November 1, 2007 to October 31, 2010, a total of 969 persons from this at-risk population were referred for the intervention. (In this article, "at risk population" refers to patients with diabetes who, without this program, would be at increased risk for diabetes complications. They would not have access to diabetes education because they either have no health insurance or have Medicaid only. In Missouri, Medicaid payment does not cover the actual cost of services nor does it pay for diabetes education.) Of these, 505 were enrolled in the program. In order to track hospital utilization and cost avoidance data, a report was generated from the Access database to identify all participants who were enrolled and active in the program for 6 or more months and who had used Mercy Hospital Joplin for either inpatient or outpatient care prior to program enrollment. A total of 81 patients who had received care in the emergency department or as an inpatient at Mercy Hospital Joplin prior to program enrollment were identified and their records reviewed for hospital utilization 1000 days prior to

TABLE 1. PATIENT DEMOGRAPHICS  
NOVEMBER 1, 2007 TO OCTOBER 31, 2010

Demographic Summary	Percent of Patients	
	Program enrollees N=505	Study group N=81
Mean Age (yrs)	51.29	53.75
Sex	Male	34%
	Female	66%
Ethnicity	White	80%
	Hispanic	9%
	Other	2%
	Hispanic and other	7%
Barriers to Learning	Visual	26%
	Hearing	10%
	Literacy	4%
	LEP	9%
	Cognitive	4%
	Other	24%

LEP, limited English proficiency.

enrolling in CSI-Diabetes and 1000 days after enrolling in the program. Hospital utilization for conditions that clearly had no relation to diabetes (eg, broken bones, sprains) were not included in the analysis.

## Results

The demographic data confirm that the 81 study participants had similar characteristics to those of the 505 program enrollees (Table 1). Although it is not possible to project degree of risk for the 81 study participants vs. the other program enrollees, it is likely that many of the study participants were at higher risk than those who did not seek medical care before they entered the program.

### Clinical outcome measures

Table 2 summarizes the clinical outcomes measures for the study group. The First Reading column shows average values for the clinical measures taken when patients first entered the program. The Last Reading column shows average values for the last available measures taken on those same patients. All last readings were at least 6 months after the

TABLE 2. CLINICAL OUTCOME MEASURES

Measure	N	First Reading	Last Reading	Difference*	P value
HbA1c	81	8.31	7.54	-0.77	0.0036**
LDL	65	110.13	101.17	-5.00	0.2500
SBP	72	130.16	126.57	-3.64	0.0931
DBP	72	75.88	75.13	-0.71	0.6332
BMI	78	36.37	36.03	-0.49	0.1708

\*The difference of the means of the first and second readings may not correspond to tabulated values because of patient attrition between measurements. \*\*Student *t* significant at 0.05 level of confidence.

BMI, body mass index; DBP, diastolic blood pressure; LDL, low-density lipoprotein; SBP, systolic blood pressure.

first reading. Although all measures trended in the desired direction, only the HbA1c reductions were statistically significant.

*Program costs*

During the time period studied, the program received grant support from the Missouri Foundation for Health. The actual direct cost was \$187,124 in the most recent year. Program costs consisted principally of salaries and office operations. Additional costs were required by the grant and included travel, evaluation, and reporting expenses. During the 3 years of operation, the program employed a clerk/interpreter at 0.5 full-time employee (FTE), a nurse educator at 1.0 FTE, and a registered dietitian at 0.8 FTE. The BSMOD program served 105 active patients in year 1; 172 patients in year 2; and 195 patients in year 3. Current staffing levels are sufficient to serve 225 patients. Staff project that with approximately 300 patients, the clerk position may need to be increased to full time. Operating costs going forward are estimated at \$140,279 annually. This estimate is based on historical costs minus start-up costs and the additional grant-related expenses.

*Financial outcomes*

Financial data for the 81-patient study group were documented for 1000 days prior to program initiation and tracked for 1000 days subsequent to program initiation. By merging information in the CSI-Diabetes database and the hospital's TRENDSTAR® database, actual direct costs for patients' visits prior to and after enrollment in the CSI-Diabetes program were extracted.

Thus, for 81 patients enrolled, the hospital realized a net savings of \$43,417 compared to what it would have cost without the program (Table 3). Savings resulted from fewer emergency room visits and fewer inpatient hospital stays. Inpatient admissions dropped from 22 inpatient admissions prior to program enrollment to 1 post program enrollment for the study population. All hospital visits (ie, inpatient, emergency room visits, outpatient therapy visits) went from an average of 3.13 per study participant per year to 1.53 per study participant per year.

Using the estimated cost of the program going forward (\$140,279) and the estimated savings of \$551 per enrolled patient annually, 255 patients must be continuously enrolled

TABLE 3. COST AT MERCY HOSPITAL JOPLIN BEFORE AND AFTER PROGRAM

	1000 Days Before Program	1000 Days After Program	Savings Per 1000 Days
Charges	\$840,667	\$183,333	\$657,334
Payments	\$131,754	\$13,287*	-\$118,467
Cost	\$204,157	\$41,073	\$163,084
Shortfall of payments	\$72,403	\$27,787	\$43,417
Avg. days traced on patient	357	619	

\*The sharp reduction in percentage of payments to charges reflects the fact that many patients enrolled in the program after losing their health insurance.

TABLE 4. ANNUAL COST AVOIDANCE

	Annualized Cost Before Program Enrollment	Annualized Cost After Program Enrollment	Annual Cost Avoidance
Annual costs not reimbursed	\$74,072	\$16,388	\$57,684
Avg. annual hospital cost/patient	\$894	\$343	\$551
Annual cost for 255 patients	\$227,970	\$87,465	\$140,505

(ie, receiving the intervention) for the hospital to break even without external grant funding (Table 4).

At project end, there were 220 patients actively enrolled. If the average cost savings per patient can be maintained with increased enrollment, approximately 35 additional patients must be enrolled. Each year, CSI-Diabetes has enrolled an average of 45 new active patients. Therefore, a goal of 35 new patients within a year is achievable. This does not imply that the hospital would discontinue the program if breakeven cannot be reached as management considers serving these patients to be consistent with its mission in the community. However, given current economic conditions, breakeven is highly desired. In the case that breakeven cannot be achieved, there would be serious discussions regarding the cost benefit of this program. At this point, there would be a shortfall of \$19,279 on an annual basis if no new participants were enrolled.

**Discussion**

This article describes a successful self-management intervention in a community general hospital that targeted an underserved population with diabetes. The intervention not only resulted in significant improvements in HbA1c levels (-0.77%) but saved the hospital an average of \$551 per active patient per year, primarily by reducing the number of hospital visits. With only 255 actively enrolled patients, the hospital can recover fully its total direct annual personnel and operating costs for the program.

The intervention described in this article not only makes good business sense, but also aligns with the hospital's mission. Even if the intervention cannot be shown to have a viable financial business case, the organization still may pursue the intervention if it is consistent with its mission and goals. However, the "it's our mission" argument does not mean that the organization will not want to know what the intervention costs and what changes in quality it produces. Rather, after computing the actual or projected costs and outcomes of the intervention, the organization can make an informed decision that the expected level of increase in quality is sufficiently large that it should be undertaken as long as the drain on financial resources does not threaten the organization's long-term survival.

In addition to implementing an intervention because it is consistent with the organization's mission, the decision to support a quality-enhancing intervention sends a message that the organization is committed to quality care. Being known for a culture of quality can have both internal and external benefits for an organization. The internal benefits

can include a higher level of staff satisfaction (which can increase staff retention and lower recruitment and retraining costs), increased productivity, and higher profitability. By definition, a culture of quality provides benefits to the patients that, in addition to improving patient care, are likely to be reflected in higher patient satisfaction scores. These benefits not only enhance the organization's local reputation, they also may be reflected in superior accreditation scores.

### Limitations

The principal limitation of this study, as with many studies of clinical interventions in community settings, is that it was not possible to assign patients to study and control groups randomly or to conceal membership in the study group from the patients and staff (double blind). Thus, the before-after design that was employed has no statistical defense against regression to the mean or observer bias. In this treatment context, random assignment would have been deemed unethical as prior evidence strongly suggested that the intervention was clinically superior to standard care. Because patients self-selected into the study cohort and the staff were specifically assigned to the study, both observer bias and a strong placebo effect might be suspected. On the other hand, neither the financial outcome measures nor clinical outcome measures could be directly influenced by the study participants, so contamination of results from these sources seems remote.

Another limitation is the possibility that study subjects obtained services outside of Mercy Hospital Joplin, and there is no way to estimate the extent that this occurred with the data available. Because enrollees in the intervention were self-selected and understood that enrollment entitled them to expanded services, it is likely that the study population utilized fewer services outside of Mercy than patients who were not enrolled in the program.

### Conclusion

At the current time, there is little or no reimbursement for care management and prevention services. Nonprofit hospitals struggle with the mission versus margin question daily. A program with unreimbursed expenses is competing for shrinking resources with services that may bring a positive return on the investment. Grant funding can provide valuable seed money to develop, test, and implement a beneficial new program, but grants are not a reliable or permanent source of funding. Being able to demonstrate that the hospital avoids more costs than it incurs by providing the service is a promising strategy to generate administrative support and achieve program sustainability. At the same time, positive clinical outcomes speak to the mission of improving health and quality of life for people who are medically underserved.

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### Author Disclosure Statement

Ms. Micklethwaite, Ms Brownson, and Drs. O'Toole and Kilpatrick disclosed no conflicts of interest.

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